INTERIM ACTION RECORD OF DECISION
DECLARATION

SITE NAME AND LOCATION

Colorado Avenue Subsite
Hastings Ground Water Contamination Site
Hastings, Nebraska

STATEMENT OF BASIS AND PURPOSE

This decision document presents the selected interim action for the Colorado Avenue subsite, Hastings Ground Water Contamination Site, Hastings, Nebraska, which was chosen in accordance with the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), and, to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). This decision is based on the administrative record for this subsite.

The State of Nebraska concurs with the selected remedy as an interim action for this subsite.

ASSESSMENT OF THE SITE

Actual or threatened releases of hazardous substances from this subsite, if not addressed by implementing the response interim action selected in this Record of Decision (ROD), may present an imminent and substantial endangerment to public health, welfare, or the environment.

DESCRIPTION OF THE SELECTED INTERIM REMEDY

This interim action Record of Decision (ROD) addresses remediation of the ground water operable unit through extraction and treatment of the contaminated ground water. This interim action relates to the ground water operable unit and will reduce the risk posed by the ground water contamination at the subsite. The Colorado Avenue subsite includes a ground water operable unit (OU 1) and a source control operable unit (OU 9). Source control remediation was addressed in a Record of Decision issued in September 1988 which called for extraction of volatile contaminants from the silt and sand unsaturated zones; monitoring contaminants in the soils above the aquifer; and monitoring of ground water contamination at the subsite.

The major components of the selected interim remedy include:

- Extraction of contaminated ground water to achieve contaminant mass removal and plume

containment;

- Treatment of contaminated ground water by granular activated carbon with contingencies for air stripping and air emissions treatment or use of ultraviolet oxidation;
- Reinjection and/or use of the treated ground water; and
- Ground water monitoring to measure interim action effectiveness.

STATUTORY DETERMINATIONS

This interim action is protective of public health, welfare and the environment, complies with action-specific and chemical-specific Federal and state applicable or relevant and appropriate requirements for this limited-scope action and is cost-effective. As explained in the attached Decision Summary, the selected interim action (remedy) and all contingency actions defined by this Record of Decision will satisfy the statutory requirements of CERCLA. Although this interim action is not intended to fully address the statutory mandate for permanence and treatment to the maximum extent practicable, this interim action utilizes treatment and thus is in furtherance of that statutory mandate. Because this action does not constitute a final remedy for the subsite, the statutory preference for remedies that employ treatment that reduces toxicity, mobility, or volume as a principal element, although partially addressed in this remedy, will be addressed by the final response action. Subsequent actions are planned to address fully the threats posed by the conditions at this subsite. Because this remedy will result in hazardous substances remaining on site above health-based levels, a review will be conducted to ensure that the remedy continues to provide adequate protection of human health and the environment within five (5) years after commencement of the remedial action. Review of this subsite and of this remedy will be ongoing as EPA continues to develop final remedial alternatives for the Colorado Avenue subsite.

9-30-91
Date

/Morris Kay
Regional Administrator
Region VII

Attachments: Decision Summary
Responsiveness Summary
Administrative Record Index

INTERIM ACTION RECORD OF DECISION

DECISION SUMMARY

HASTINGS GROUND WATER CONTAMINATION SITE

COLORADO AVENUE SUBSITE

HASTINGS, NEBRASKA

Prepared by:

U.S. Environmental Protection Agency

Region VII

Kansas City, Kansas

September 30, 1991

Interim Action Record of Decision

Decision Summary
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DECISION SUMMARY
COLORADO AVENUE SUBSITE
HASTINGS GROUND WATER CONTAMINATION SITE

SITE DESCRIPTION

The Colorado Avenue subsite consists of contaminated soils and a ground water contaminant plume of approximately one mile in length and is one of several subsites that make up the larger Hastings Ground Water Contamination Site in Hastings, Nebraska (Figure 1). The subsite is part of the Central Industrial Area, which contains commercial and industrial properties situated along the Burlington-Northern Railroad right-of-way. The Colorado Avenue plume is moving eastward in Hastings and has forced the City of Hastings to remove several contaminated wells from service.

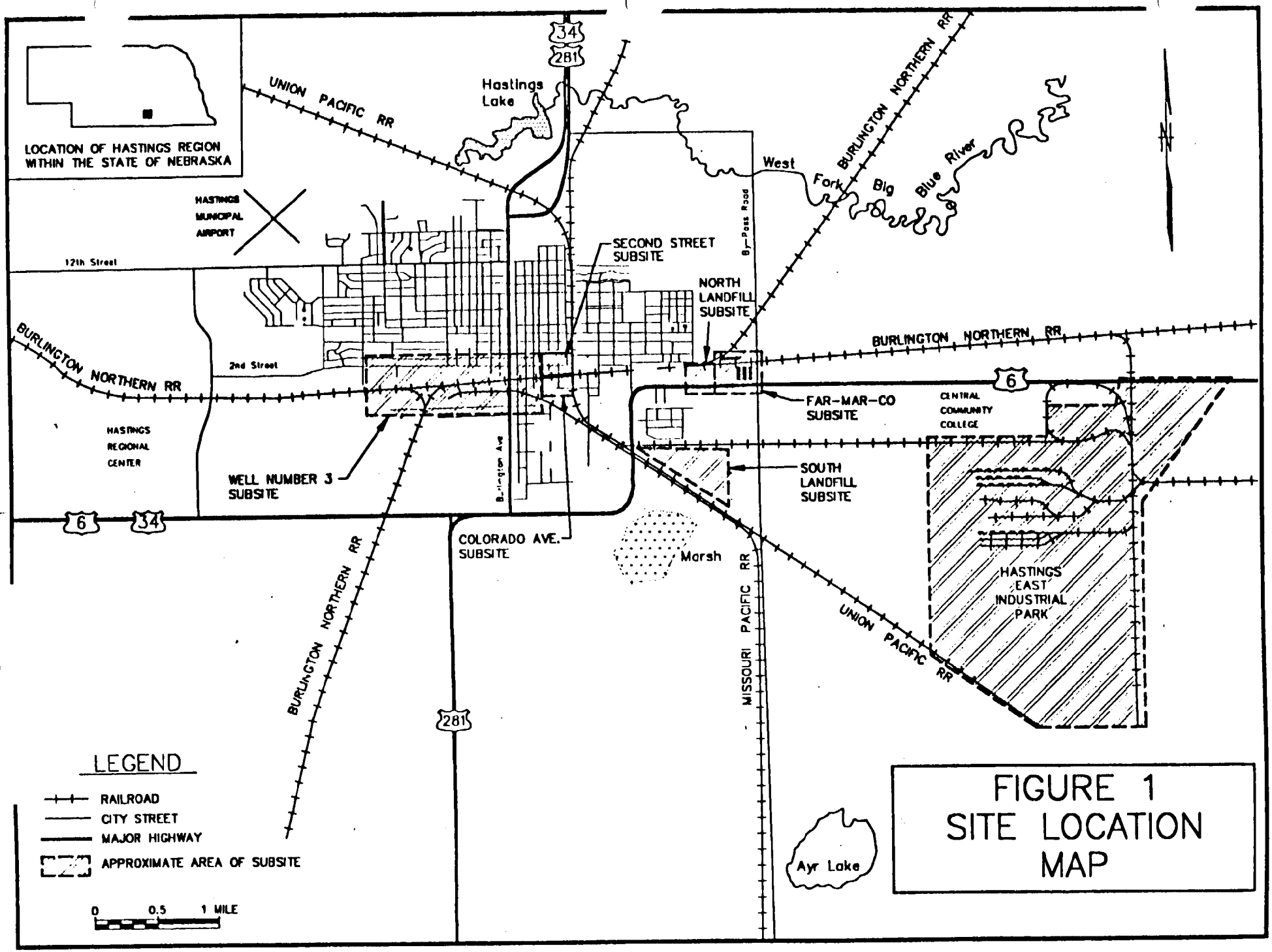
Soil contamination was found at three industrial properties within the subsite. Dravo Corporation, former owner of one of the industrial properties, discharged waste solvents from its vapor degreasing process into sewer lines at the Colorado Avenue subsite. Residential properties are located immediately south and east of the subsite. There are no wetlands or natural resources located within the subsite area.

The population within the City of Hastings is approximately 23,000. The City obtains all of its drinking water supply from the municipal system which taps the Pleistocene-age ground water aquifer. The contamination problems addressed by this interim ROD pertain to this aquifer.

The City of Hastings and the surrounding area are characterized by a nearly flat ground surface with a gentle slope to the southeast. This topography is typical of the loess plains that are present in south-central Nebraska. The majority of the site region is uplands with narrow floodplains located along the streams. Most of the area drains via tributaries to the West Fork Big Blue River. The areas east and south of the city limits drain to the Little Blue River. This region of Nebraska is blanketed by loess that is underlain by unconsolidated soils, primarily sands and gravels, deposited during the Pleistocene and Pliocene epochs. The soil deposits range in thickness from 100 to 250 feet.

SITE HISTORY

The ground water contamination addressed by this ROD was discovered in 1983 when the City of Hastings attempted to put Municipal Well M-18 back into service. Well 18 is one half mile east of the former Dravo facility on Colorado Avenue. The well had not been used for approximately 30 years. Following startup,


LOCATION OF HASTINGS REGION WITHIN THE STATE OF NEBRASKA
UNION PACIFIC RR
Hastings Lake
34
281
BURLINGTON NORTHERN RR
West Fork Big Blue River
HASTINGS MUNICIPAL AIRPORT
12th Street
SECOND STREET SUBSITE
By-Pass Road
NORTH LANDFILL SUBSITE
BURLINGTON NORTHERN RR
2nd Street
6
FAR-MAR-CO SUBSITE
CENTRAL COMMUNITY COLLEGE
HASTINGS REGIONAL CENTER
WELL NUMBER 3 SUBSITE
Burlington Ave
SOUTH LANDFILL SUBSITE
6
34
COLORADO AVE. SUBSITE
Marsh
HASTINGS EAST INDUSTRIAL PARK
BURLINGTON NORTHERN RR
MISSOURI PACIFIC RR
UNION PACIFIC RR
281
Ayr Lake
LEGEND
RAILROAD
CITY STREET
MAJOR HIGHWAY
APPROXIMATE AREA OF SUBSITE
0 0.5 1 MILE
FIGURE 1
SITE LOCATION
MAP

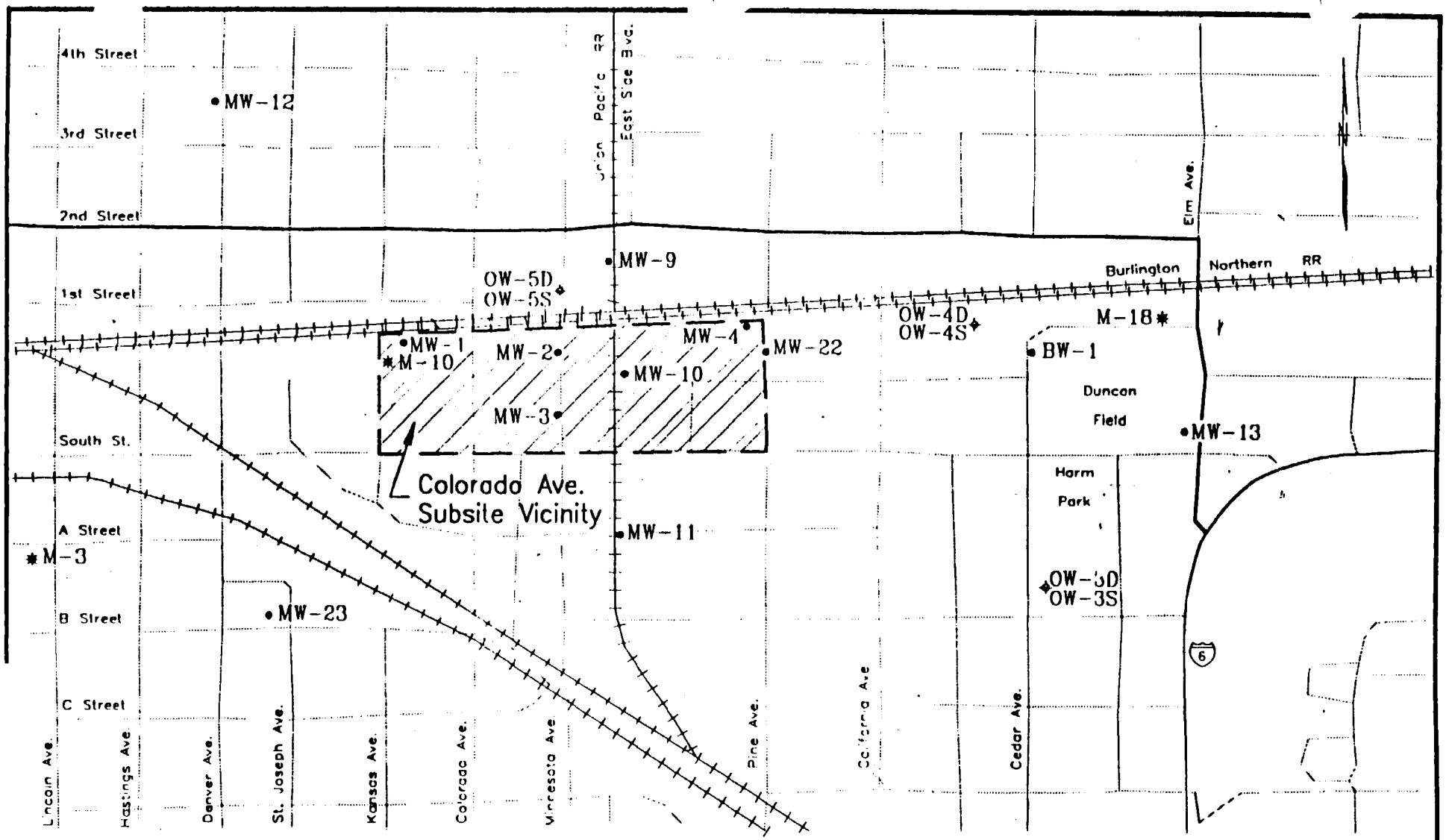
CAR738

the city received complaints from citizens of a foul taste and odor from the water. The city promptly removed the well from service. The Nebraska Department of Health (NDOH) and the Nebraska Department of Environmental Control (NDEC) analyzed samples collected from M-18 in 1983 and 1984 and detected elevated levels of the compounds 1,1,1-trichloroethane (TCA), trichloroethene (TCE), and tetrachloroethene (PCE). These compounds belong to a general class of compounds referred to as volatile organic compounds (VOCs). VOCs are those chemicals that tend to evaporate when exposed to air. The NDOH and NDEC also detected elevated levels of these and other VOCs in three other municipal wells in Hastings. These wells, M-3, M-10, and M-12, were taken out of service.

Due to risks posed by the ground water contamination in the Hastings area, EPA identified the area as a proposed Superfund site in 1984 and placed it on the National Priorities List (NPL) in 1986. The NPL is a nationwide list of hazardous waste sites that are eligible for investigation and remediation under the Superfund program.

In 1985, EPA began an investigation of the contamination detected in Municipal Well M-18 as part of a larger overall investigation of ground water contamination problems in the Hastings area. Evidence collected during the investigation indicates that the TCA, TCE, and PCE contamination in Well M-18 originated in the general vicinity of the former Dravo Corporation industrial facility located at 108 South Colorado Avenue. This facility is now owned by Marshalltown Instruments Company. Evidence indicates that the chlorinated solvents (TCE, TCA, and PCE) were used at the industrial facility located at 108 S. Colorado Avenue and disposed of in sanitary and storm sewers during the 1960s and 1970s when Dravo occupied the facility. Due to leakage from joints in the sewers and the discharge of the storm sewer to an open ditch, the contaminants seeped through the soil and reached the Pleistocene-age aquifer underlying the Colorado Avenue subsite.

The EPA installed ground water monitoring wells at the subsite (Figure 2). Since 1985, many water quality sampling events have occurred. Existing wells and EPA-installed wells have been sampled. The EPA analyzed samples of soil collected from the areas around the suspected leaking sewers. These soil samples showed elevated levels of volatile organic chemicals including the chlorinated solvents named above. Due to these findings, EPA designated the ground water contamination and soil contamination at the subsite as two projects or operable units. In September 1988, EPA signed a Record of Decision which addressed the soil contamination at the subsite. The EPA issued a Unilateral Administrative Order to Dravo Corporation and Marshalltown Instruments in 1990. The order requires the respondents to proceed with the soils cleanup project.



LEGEND

- EPA MONITORING WELL
- MUNICIPAL WELL
- STATE MONITORING WELL

0 150' 300' 600'

SCALE

FIGURE 2
COLORADO AVENUE SUBSITE

CAR740

ENFORCEMENT HISTORY

In September 1985, general notice letters were issued to potentially responsible parties (PRPs) connected with the Hastings Ground Water Contamination site. PRPs are those individuals or businesses potentially responsible for the contamination at a site. The first meeting held with PRPs for the Hastings Ground Water Contamination site was held in October, 1985, at which time the PRPs were asked to perform a Remedial Investigation/Feasibility Study (RI/FS) for the entire Hastings site. No proposals to undertake the RI/FS were made by the PRPs. The EPA proceeded with the remedial investigations at selected subsites, including the Colorado Avenue subsite.

In December 1986, EPA issued general notice letters which notified Dravo Corporation and Marshalltown Instruments of their potential liability at the Colorado Avenue subsite. In January 1987, EPA held a PRP meeting to review EPA's findings to date. Dravo Corporation and Marshalltown Instruments were asked to complete the RI/FS investigations. Neither party made an offer. During meetings held with the PRPs in 1987, EPA requested that the needed removal interim actions be done by the PRPs. The PRPs refused to complete the RI/FS and did not agree to undertake any removal actions. The first offer made to EPA was by Dravo Corporation following the issuance of a special notice letter on August 25, 1987, and the 60-day moratorium which followed. Pursuant to Section 122(e) of CERCLA, the special notice letter granted a period of negotiation in an attempt to "facilitate an agreement" with Dravo to expedite remedial action. Section 122(e)(2)(B) of the statute allows 60 days for the liable party to make a good faith offer to perform the needed work as outlined by EPA. Instead of offering to perform the work, Dravo asked to be considered for a de minimis settlement as defined in CERCLA, Section 122. Section 122(g) statutorily authorizes de minimis settlements to efficiently resolve cases in which the PRP contributed small amounts of hazardous substances with minimal toxicity to the site or the PRP is the site owner but did not introduce the hazardous substances or contribute to the release. The Agency informed Dravo that it could not accept its offer as it did not meet the requisite statutory criteria for such a settlement. Dravo did not counter-offer after receiving the Agency's response. Dravo and Marshalltown were requested to sign an order pursuant to Section 106 of CERCLA in 1988 which would have required them, among other things, to implement a source control response action. In April 1988, Marshalltown requested its status as a liable party be reviewed and it submitted documents to support its position that it had not disposed of TCA at its facility. The Agency reviewed Marshalltown's status pursuant to this request and determined that Marshalltown was not eligible for a CERCLA Section 107(b)(3) defense which states that there is no liability for persons who can prove the release or

threat of release of hazardous substances resulted from specific occurrences caused by an act of God, an act of war, or an act or omission of a third party under certain conditions. Marshalltown had an indirect contractual relationship with one (another party) who had disposed of TCA at the subsite and Marshalltown had reason to know of the disposal, as that term is defined under CERCLA, when it purchased the property.

In April 1988, the PRPs for the Hastings subsites formed a steering committee to work with EPA in developing the most efficient and cost-effective remedial actions. On April 13, 1988, the Hastings PRPs met with EPA and offered to undertake a pilot study of soil vapor extraction (SVE), the preferred alternative to remediate soil contamination at the subsite. The Agency requested that the PRPs submit a proposal. On June 8, June 28, and July 22, 1988, EPA met with the PRPs to discuss pilot scale testing for source control at the Colorado Avenue subsite. A draft proposal by EPA concerning Colorado Avenue was discussed on July 22, 1988, and negotiations continued in August 1988. The source control ROD was issued by EPA in September 1988. A pilot study of the SVE process was carried out by the PRPs pursuant to an order issued under Section 106 of CERCLA. The pilot study, which began in August 1989 and ended in December 1989, was successful in removing VOCs from the soil at the subsite. Data from the pilot study are providing the basis for designing a full-scale SVE remedial action project at the subsite. The EPA asked the PRPs to undertake the full-scale SVE project, but Dravo and Marshalltown failed to submit a good faith offer as requested. In September 1990, EPA issued a Unilateral Administrative Order pursuant to Section 106 of CERCLA ordering them to implement the SVE remedial action at the Colorado Avenue subsite. Design work pursuant to the Unilateral Administrative Order is currently proceeding.

In December 1990 following continued dialogue with the Dravo and Marshalltown, EPA sent the PRPs a notice letter requesting that they undertake a Feasibility Study (FS) for the ground water operable unit. Dravo and Marshalltown declined to undertake the FS. The EPA completed the FS in June 1991.

COMMUNITY RELATIONS

Community relations activities for the Hastings Ground Water Contamination site were initiated by EPA in 1984. Early community relations activities included meeting with City and state officials to discuss the site (December 1984), conducting interviews with local officials and interested residents (February 1985), establishing an information repository (February 1985), and preparing a Community Relations Plan (October 1985). Since December 1984, EPA has conducted periodic meetings with

Hastings officials to update them regarding site work and findings. The Community Relations Plan was revised and updated in January 1988 and in January 1990 to reflect new community concerns and site activities.

Information on the Colorado Avenue subsite has been mailed to all parties on the mailing list for the Hastings Ground Water Contamination site. Specific community relations activities that have been conducted regarding the subsite include distributing fact sheets updating citizens on subsite activities, announcing and conducting public meetings, and summarizing preferred alternatives. Public meetings at which information regarding the Colorado Avenue subsite has been made available include the following:

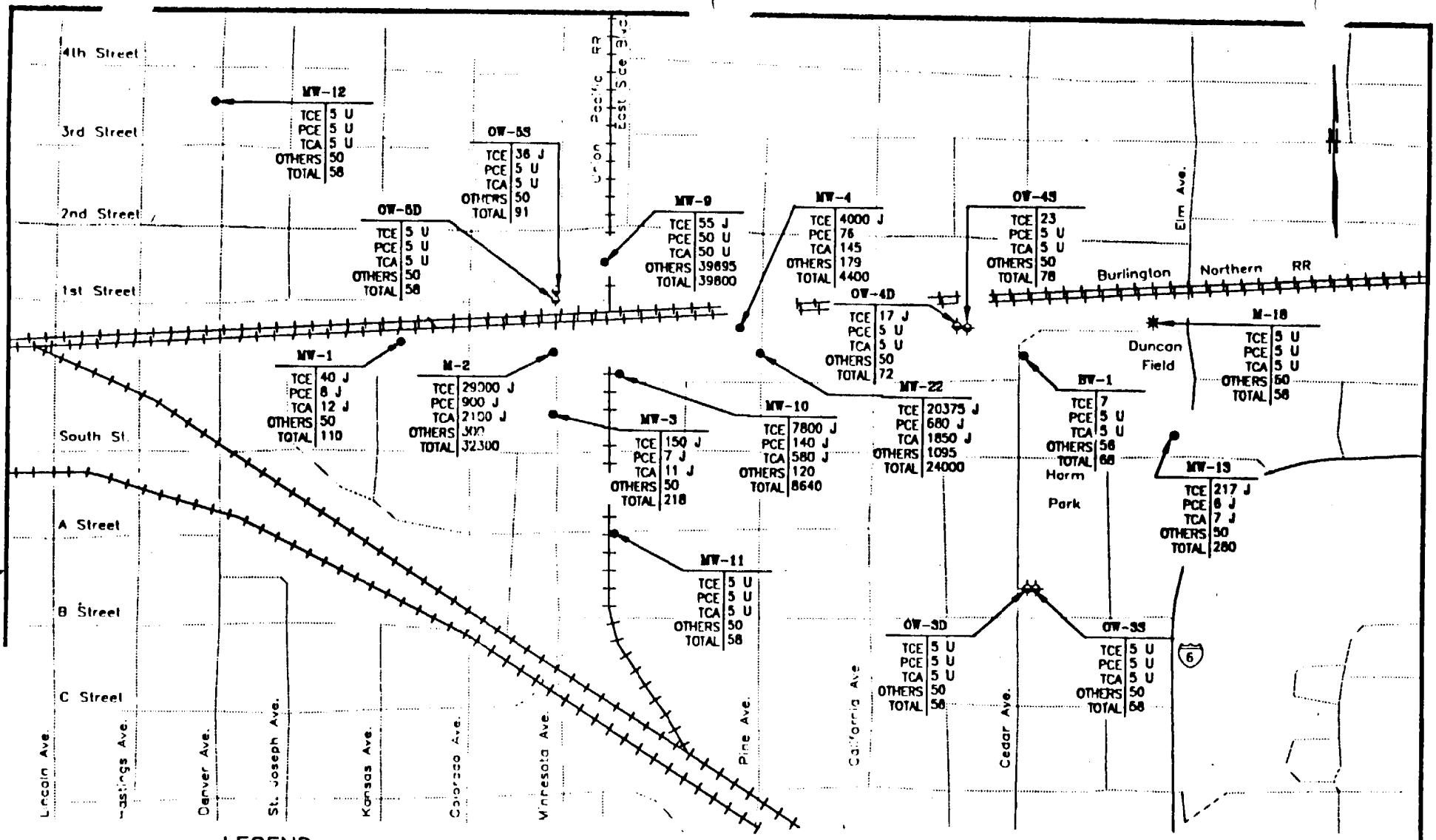
- On November 22, 1985, a public meeting was held to present site information and plans for the RI/FS and to respond to citizens' questions;
- On March 5, 1988, a public meeting was held to discuss the preferred alternatives for source control and to receive citizens' comments and questions; and
- On July 18, 1991, a public meeting was held to discuss the preferred alternatives for ground water remediation and to receive citizens' comments and questions.

Following release of the Engineering Evaluation/Cost Analysis (EE/CA) in February 1988 for source control at the Colorado Avenue subsite, EPA held a public comment period from February 3 to April 30, 1988. Agency responses to public comments were included in the Responsiveness Summary portion of the Record of Decision issued in September 1988 for soil cleanup at the subsite.

The EPA also held a public comment period from June 25 to August 23, 1991, following the release of the Proposed Plan which identified measures to mitigate the ground water contamination at the Colorado Avenue subsite. Agency responses to these comments are included in the Responsiveness Summary portion of this Record of Decision.

SCOPE AND ROLE OF OPERABLE UNIT

This interim action will involve pumping the contaminated ground water out of the contaminated area in the aquifer and treating the water to remove the contaminants. This will provide for reduction in risk to human health from potential exposure to the contaminants, and prevent environmental degradation due to further spread of the highly contaminated portion of the plume. The reduction in risk will be achieved by removal of contaminant mass, thereby reducing the concentrations of the chemicals in ground water (area shown in Figure 3). The Colorado Avenue



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LEGEND

- EPA MONITORING WELL
- MUNICIPAL WELL
- STATE MONITORING WELL

} CONCENTRATIONS ARE POSTED IN $\mu g/l$

0 150' 300' 600'
SCALE

NOTE:
"U" = UNDETECTED AT NOTED CONCENTRATION
"J" = ESTIMATED VALUE

FIGURE 3
TOTAL VOC CONCENTRATIONS
SEPTEMBER, 1990

subsite includes a source control operable unit (OU 9) and a ground water operable unit (OU 1). Source control remediation was addressed in a Record of Decision issued in September 1988 which called for extraction of volatile contaminants from the silt and sand unsaturated zones; monitoring contaminants in the soils above the aquifer; and monitoring of ground water contamination at the subsite. The EPA issued a Unilateral Administrative Order to the liable parties for the source control cleanup and testing of the soils, and proceeded with data collection for the ground water operable unit.

This ROD is consistent, to the extent practicable, with the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), an EPA regulation which establishes procedures for the selection of response actions. According to the NCP, an interim action is appropriate where a contamination problem will become worse if left unaddressed, and the interim action will not be inconsistent with any final remedial action. Because a final remedial action will follow, the interim action need not meet all federal and state standards for clean up of the aquifer, nor must it provide a permanent solution to the contamination problems. In accordance with the NCP, the interim action for the Colorado Avenue subsite will complement and be consistent with the final remedy for the subsite because the interim action and the final action must be permanent, effective and employ treatment to the extent possible. This is explained further in EPA's FS. The final remedy may include additional source control measures, subsurface monitoring, ground water extraction and treatment options, well head protection and treatment and institutional controls. Any future actions will be considered and selected based on the requirements of the NCP and remedy selection process as described herein.

This interim action is fully consistent with all anticipated future site work. This statement is based on the fact that pumping and treatment is the only technology currently available which has been implemented at enough sites to be considered applicable to the conditions at the Hastings site.

The subsite interim actions will have an interim goal to achieve containment of the plume and reduction of contaminant concentrations within the plume at levels corresponding to no more than an estimated one cancer case in a population of 10,000 based on an assumed 30-year exposure period due to any of the contaminants present (for further explanation of excess cancer risks, see "Summary of Site Risks"). The contaminant levels which correspond to one in 10,000 (also known as 1×10^{-4}) cancer risk due to exposure to the contaminants of concern at the subsite are shown in Table 1. Also shown are the Maximum Contaminant Levels (MCLs) for the contaminants which will be the goal for any final remedy. The EPA will ensure that any final remedial action will be protective of human health and the

Table 1

Colorado Avenue Interim Action Target Concentrations for Ground Water

Health-Based Risk Levels and Chemical-Specific ARARs (MCLs) Of Compounds Detected in Ground Water

Contaminant	10^{-6} Cancer Risk Due to 30-Year Exposure[a] mg/l	Safe Drinking Water Act (SDWA) Maximum Contaminant Level (MCL) mg/l	Nebraska MCL mg/l	SDWA MCLG[b] mg/l
1,1-Dichloroethene (DCE)	0.005	0.007	0.007	0.007
Tetrachloroethene (PCE)	0.150	0.005	0.005	0
1,1,1-Trichloroethane (TCA)	N/A	0.200	0.200	0.200
Trichloroethene (TCE)	0.290	0.005	0.005	0
1,2-Dichloroethane (1,2-DCA)	0.045	0.005	0.005	0
Dichloromethane[c]	0.900	0.005	0.005	0

[a]Reference: Colorado Avenue Ground Water Interim Action Operable Unit Feasibility Study, June 1991.
[b]Maximum Contaminant Level Goal.
[c]Also known as Methylene Chloride

Note: All values above are shown in ppm, 1 ppm = 1 milligram per liter = 1 mg/l
(1 mg/l = 1,000 micrograms per liter (ug/l) where 1 ug/l is equivalent to 1 ppb)

environment relative to contamination emanating from the Colorado Avenue subsite. Currently, contaminants in the ground water are not being consumed by humans since affected municipal wells are out of service. No private domestic water supply wells are currently in use within the city. Testing results from samples collected during EPA's on-going investigations are supplied to the City and Nebraska Department of Health (NDOH). If future sampling indicates the chemicals have migrated to other supply wells, the NDOH is authorized under the Safe Drinking Water Act to respond to this problem in order to ensure continued public access to safe drinking water supplies. However, their options are limited considering the extent of the plume.

SITE CHARACTERISTICS

Ground water in the Pleistocene-age ground water aquifer, located underneath the subsite, is generally encountered at a depth of approximately 120 feet. This aquifer is the sole source of drinking water for the Hastings area and is used extensively for industrial and irrigation purposes.

Regional ground water flows east-southeast with local deviations where ground water intersects streams and pumping wells. The ground water flow rate is approximately one foot per day. The only places in south-central Nebraska where natural ground water discharge occurs are the stretches of stream valleys incised below the water table. The largest of these streams are the Platte, Big Blue, Little Blue, and Republican Rivers. High-yield municipal and irrigation wells and lower yield private wells account for most of the balance of the discharge in the area.

Since 1985, EPA has installed ground water monitoring wells at several of the subsites which make up the Hastings Ground Water Contamination Site. The EPA has conducted quarterly ground water sampling. EPA installed ground water monitoring wells at the Colorado Avenue subsite from 1986 to 1989 (Figure 2). Table 2 shows the chemicals detected in the vicinity of the subsite, the lifetime or 30-year incremental cancer risks associated with exposure to these chemicals and their frequency of detection. As indicated, EPA has detected elevated levels of a number of VOCs in the ground water including trichloroethene (TCE), and 1,1,1-trichloroethane (TCA), tetrachloroethene (PCE), and 1,1-dichloroethene (DCE). At the subsite, TCE, TCA, and PCE have been detected in the greatest number of ground water monitoring wells, and at the highest levels. Also present in the ground water are 1,1-dichloroethene and 1,1 and 1,2-dichloroethane, which form when TCE, TCA, and PCE break down. The apparent original source of these VOCs was Dravo's industrial facility on Colorado Avenue.

Table 2

Volatile Organic Compounds Detected in Ground Water
Colorado Avenue Subsite
1985 to 1990

Compound	Target Concentration for 1 x 10^{-4} Cancer Risk (ug/l)	Highest Concentration (ug/l)	Location of Highest Detected Concentration	Number of Locations Detected
Halogenated Volatiles				
Trichloroethene	290	55,000	MW-2	19
1,1,1-Trichloroethane		3,000 J	MW-22	15
Tetrachloroethene	150	1,300	MW-2	13
1,1,2,2-Tetrachloroethane		530	MW-2	2
1,1-Dichloroethene	5	400 J	MW-22	9
1,2-Dichloroethene (total)		630 J	MW-22	9
1,1-Dichloroethane		400 J	MW-22	7
1,2-Dichloroethane	45	42	MW-22	3
Chloroform	94	26	MW-4	3
Chloroethane		14 J	MW-22	2
Bromodichloromethane	31	0.7 J	MW-10	1
Methylene Chloride	900	2,200	MW-2	8
Carbon Tetrachloride	31	100	MW-10	8
Volatile Aromatics - From Nearby Second Street Subsite				
Toluene		15,000 J	MW-9	14
Benzene	140	15,000 J	MW-9	8
Acetone		8,000	MW-9	9
Xylenes (total		5,200 J	MW-9	7
Ethyl Benzene		3,200	MW-9	6
Styrene	260	7,800 J	MW-9	2

Notes:

[1] Database of wells (Table B-1 of FS) depicted on Figure 2.

[2] Risk numbers listed only for potential carcinogens.
Source: Colorado Avenue Feasibility Study Report.

[3] J = estimated concentration

[4] Carbon tetrachloride is not attributable to Colorado Avenue.

[5] Volatile aromatic compounds are not attributable to Colorado Avenue.

VOCs remaining in the unsaturated zone above the water table provide a continuing source of ground water contamination. Vapor phase contaminants migrate through the soil pore spaces downward to the ground water since the contaminant vapors are heavier than air. Control of this source area was addressed by the 1988 ROD for the soils operable unit.

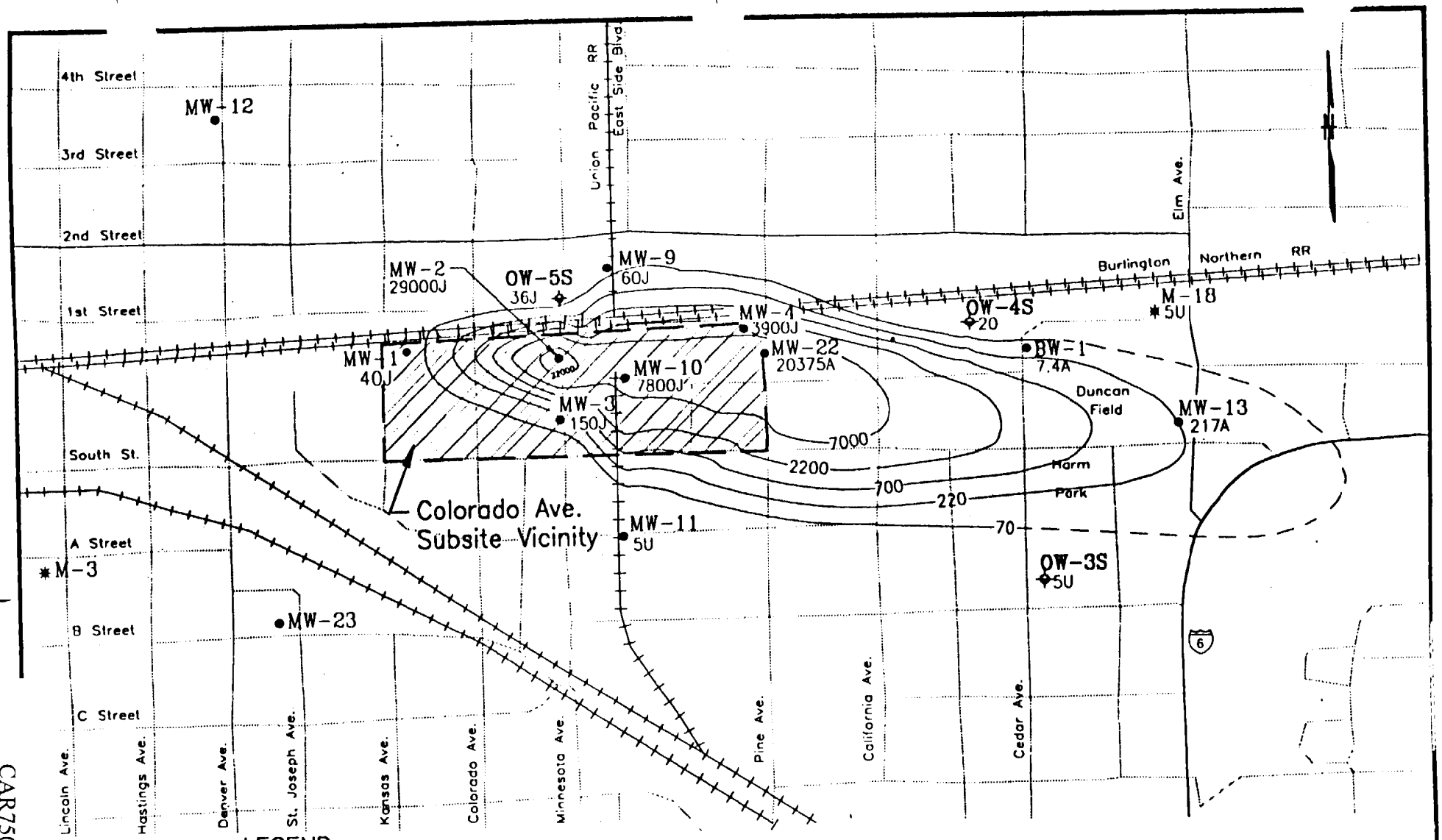
The EPA also detected elevated levels of benzene in a monitoring well north of the subsite, away from the direction of ground water flow, and concluded that the benzene contamination was coming from a source other than the Colorado Avenue property. After identifying the source area north of the Burlington-Northern Railroad tracks, EPA designated that area as the Second Street subsite. The EPA has conducted soil sampling to further characterize the aromatic chemical contamination found at the Second Street subsite.

Based on the results from the September 1990 sampling (Figures 3 and 4), consideration of seasonal trends of concentrations of the various constituents in the ground water, and the concentrations corresponding to the 1×10^{-4} cancer risk for the chemicals of concern, EPA has determined that the ground water requires a response action. The volume of ground water to be addressed by the interim action based on preliminary estimates is approximately 550 million gallons, and contains approximately 18,800 pounds of TCE.

SUMMARY OF SITE RISKS

The Superfund law requires EPA to seek permanent solutions to protect human health and the environment from hazardous chemicals. These solutions provide for removal, treatment, or containment of dangerous chemicals so that any remaining contamination does not pose a health risk to anyone who might come into contact with it. The EPA has determined that an interim action is needed at the Colorado Avenue subsite based on its evaluation of the contamination in the ground water.

The EPA has evaluated potential risks to human health posed by exposure to ground water contamination if no remedial action were taken. This approach attempts to answer the question of what could occur if no action were taken at a site. This evaluation is known as a baseline risk assessment. The Baseline Risk Assessment, which is a portion of the FS, is based on the results of statistical analysis of water samples taken at the subsite from 1985 to 1990 and evaluates potential carcinogenic and noncarcinogenic risks which exist at the site. The results presented here apply to the 1991 Baseline Risk Assessment study, as it was based on a more complete set of ground water monitoring results than the 1987 study appearing in "Report of Investigation, Hastings Ground Water Contamination Site, Colorado Avenue Subsite", 1987.



LEGEND

- ● EPA MONITORING WELL
- ✱ MUNICIPAL WELL
- ✧ STATE MONITORING WELL

} CONCENTRATIONS OF TCE ARE POSTED IN µg/l

— 220 — CONTOUR INTERVAL

– – 70 – – INFERRED CONTOUR INTERVAL

0 150' 300' 600'

SCALE

NOTE:

"U" = NOT DETECTED AT NOTED CONCENTRATION

"J" = ESTIMATED VALUE

"A" = DEPTH – AVERAGED VALUE

FIGURE 4
PLUME MAP
DATA FROM SEPTEMBER, 1990

CAR750

<37800044

In preparing the Baseline Risk Assessment, EPA first determined the most likely ways in which community members might come into contact with site-related chemicals. The EPA determined that residents living near the Colorado Avenue subsite might be exposed to contaminants in ground water if they drink ground water, come into direct contact with the ground water while bathing, or if they inhale ground water vapors while cooking or showering. The EPA concluded that three chemicals in the ground water were the principle concern at the Colorado Avenue subsite and might pose a health risk of concern to residents who use the ground water. These chemicals are DCE, PCE, and TCE. The interim action will focus on reducing risks to human health and the environment resulting from exposure to these chemicals.

The EPA considers that exposure to a chemical presents an unacceptable cancer risk if it leads to more than one additional case of cancer for every 10,000 people exposed to it over a 30-year period. The term cancer risk sometimes is referred to as "excess cancer risk" because it is the number of additional cases above the average number of cases that are expected to occur in the general population if the chemicals are not present. The EPA's assessment of the Colorado Avenue subsite determined that the single exposure to the DCE concentrations detected might lead to 10 additional cancer cases per 10,000 people; exposure to the PCE concentrations detected might lead to two additional cancer cases for every 10,000 people exposed; and exposure to the TCE concentrations detected might lead to 100 additional cancer cases per 10,000 people over a 30-year period. These cancer risks are additive for the chemicals presenting an exposure potential. In addition to estimating potential carcinogenic health effects, the Baseline Risk Assessment evaluated potential non-carcinogenic health effects caused by site-related chemicals. The EPA determined that TCE is the primary chemical detected in the ground water that might cause harmful non-carcinogenic health effects to nearby residents using the ground water. The fact that these risk levels are found at the subsite prompted EPA to evaluate plume management alternatives for an interim action. The interim action is needed to achieve significant risk reduction while a final remedial solution is being developed.

As a result of releases of hazardous substances from the Colorado Avenue subsite into the environment, these four chemicals below are found in the ground water at concentrations which far exceed human health-based criteria. The EPA's description of health effects including classification for

varying levels of carcinogenicity are provided below for the principal contaminants of concern:[1]

- Trichloroethene (TCE) is categorized as group B-2, Probable Human Carcinogen for both inhalation and oral intake routes, based upon sufficient evidence of carcinogenicity in animals, but inadequate evidence of carcinogenicity in humans. Acute exposure to TCE may cause headaches, vertigo, visual disturbance, tremors, nausea, vomiting, eye irritation, dermatitis, cardiac arrhythmias, and paresthesia. Chronic exposure may irreversibly damage the respiratory system, heart, liver, kidneys, and central nervous system.

- 1,1,1-Trichloroethane (TCA) is categorized as group D, Not Classified, based upon inadequate evidence of carcinogenicity in animals. TCA is still unclassified in the Integrated Risk Information System (IRIS) as of June 1991. Acute exposure to TCA may cause headaches, lassitude, central nervous system depression, poor equilibrium, eye irritation, dermatitis, and cardiac arrhythmias. Chronic exposure may cause irreversible damage to the central nervous system, cardiovascular system, and eyes.

- Tetrachloroethene (PCE) is categorized as group B-2, Probable Human Carcinogen for both the inhalation and oral intake routes, based upon sufficient evidence of carcinogenicity in animals, but inadequate evidence of carcinogenicity in humans. Acute exposure to PCE may cause irritation to the eyes, nose, and throat; finger tremors; flushed face and neck; vertigo, dizziness; skin erythema; liver damage; and mental confusion. Chronic exposure may lead to irreversible damage of the liver, kidneys, eyes, upper respiratory system, and central nervous system.

- 1,1-Dichloroethene (DCE) is categorized as group C, Possible Human Carcinogen for both inhalation and oral intake routes, based upon limited evidence of carcinogenicity in animals. Acute exposure to DCE may cause irritation to the skin and mucous membranes, headaches, and liver and kidney damage. Chronic exposure may lead to irreversible damage of the liver and kidneys. It is considered an experimental mutagen.

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[1]Reference: EPA Weight-of-Evidence Categories for Potential Carcinogens. (Exhibit B-2). "Superfund Public Health Evaluation Manual."

The interim action will reduce contaminant concentrations in the aquifer to a level at or below that which will present a cancer risk of 1 x 10^{-4}, (or a risk of less than one cancer case in 10,000 due to exposure to contamination) by removing contaminants from the ground water. This will provide a significant level of protectiveness to human health. In addition to risk reduction, the interim action will prevent further degradation of the environment by plume containment. Pumping wells will be installed to capture contaminants before they migrate further eastward with the flow of the ground water.

DESCRIPTION OF ALTERNATIVES

Remedial alternatives for ground water interim actions were developed in order to mitigate further degradation and to meet the objectives of CERCLA and, to the extent practicable, the NCP. The process used to evaluate alternatives for the Colorado Avenue subsite is discussed in the FS. CERCLA and the NCP require that each alternative developed, including the no-action alternative, be evaluated first with respect to two threshold criteria: overall protection of human health and the environment; and compliance with applicable or relevant and appropriate environmental requirements (ARARs). Seven additional criteria are considered as a means to compare the alternatives. These include: long-term effectiveness; reduction of toxicity, mobility or volume; short-term effectiveness; implementability; cost; state acceptance; and community acceptance.

The remedial alternatives described in the Feasibility Study fall into three general categories. These are no action, institutional controls, and plume management. Each plume management alternative includes mass removal of contaminated ground water and containment of the contaminant plume. Capital and Operation & Maintenance (O&M) cost estimates are presented in Table 6. The following summary will focus on significant evaluation criteria as they relate to the alternatives developed for the Colorado Avenue subsite.

No Action

The NCP requires that the no action alternative be carried forward for detailed analysis and serve as a basis against which the other remedial alternatives can be compared. Under the no action alternative, the subsite would remain in its present condition. The potential for exposure of the community to contaminant levels exceeding health standards still would exist. The no action alternative fails to meet ARARs, or satisfy remedial action goals for the subsite to rapidly reduce human health risk. The alternative does not prevent further degradation of ground water or reduce risks associated with exposure to ground water.

Institutional Controls

Institutional controls are actions which lower the risk or exposure to contamination through physical and/or legal means. For areas affected by the Colorado Avenue plume, institutional controls would include access restrictions to limit future development and water well installation. Institutional controls can be effective in preventing City residents from ingesting contaminated water from onsite wells. Ground water monitoring could be used as a means primarily to warn potential future users of the aquifer. Institutional controls have been implemented in the City of Hastings since 1984 to prevent pumping of contaminated water into the city water distribution system. Four City of Hastings wells have been removed from service because of ground water contamination. City ordinances are in place that prohibit private parties from drilling drinking water wells in the city. Although institutional controls have been effective in preventing public exposure to contaminated ground water, this alternative will not attain ARARs, satisfy the remedial action objectives established, or compare favorably with the plume management alternatives when evaluated in terms of the nine criteria evaluation.

Plume Management Alternatives

The plume management alternatives differ by ground water treatment process and the treated water discharge options. Each plume management alternative includes mass removal and containment of the contaminated ground water to prevent contaminant plume migration and further contamination of the area ground water. The ground water treatment processes considered were air stripping with granular activated carbon (GAC) with either on- or off-site regeneration of the carbon liquid phase GAC, and ultraviolet (UV) photooxidation. The treated water discharge options considered were surface discharge, reinjection, and pumping to the city (or industrial) water supply. Each of these processes is described in Table 3.

In order to compare mass removal and containment alternatives on a common cost basis, an estimate was made of the ground water pumping rate that would have to be used to achieve the target concentration (less than 290 ug/l for TCE for a 1 x 10^{-4} risk level) in a 10-year period. Preliminary analyses indicated that the affected volume of ground water, approximately 550 million gallons, could be circulated eight times through the aquifer over 10 years at a flow rate of 1,000 gallons per minute, and that this would be sufficient to reach the interim action cleanup level. This flow rate and duration was considered in an effort to estimate costs of the ground water alternatives. Other pumping rates are possible. A low rate that would only control the spread of ground water but not aggressively remove

Table 3
Description of Alternatives

EPA's selected remedy for the Colorado Avenue subsite appears below in bold-italic typeface. EPA identified optional components which are indicated by asterisks.

PLUME MANAGEMENT

Mass Removal and Containment
The contaminated ground water is pumped to the surface to prevent the contaminant plume from spreading and further contaminating the ground water. Wells would be installed in the contaminant plume and ground water would be pumped to the surface and treated. The pumping process lowers the ground water level in the area. This forces ground water from the surrounding area to flow into the area with the lowered water level. The incoming water displaces the contaminant plume and reduces contaminant concentrations.

GROUND WATER TREATMENT

Liquid Phase Granular Activated Carbon (GAC)
With liquid phase GAC, the ground water is passed over a bed of granular activated carbon to remove contaminants. The carbon then would be transported off-site and the chemicals removed from it using an EPA-approved technique so that the carbon could be used again.

*Air Stripping
An air stripper transports the contaminated ground water through a pipeline to the top of the air stripper tower where the water is released. As the water falls down over a group of loosely-packed plastic balls, a fan blows air up through the water. The blowing air forces organic compounds in the water to evaporate. Before being released to the atmosphere, the evaporated chemicals would be treated by vapor phase granulated carbon.

Vapor Phase Granular Activated Carbon (GAC) with On- or Off-Site Regeneration
This process involves passing the contaminated air over a bed of specially-treated carbon, to which the evaporated chemicals cling. The treated air would be released to the atmosphere, and the carbon is transported off-site and treated to remove the chemicals clinging to it. On-site regeneration would include heating the carbon to force the chemicals to evaporate into steam. The steam would be cooled to water, which then would be treated to remove the chemicals. The chemicals would be disposed of or destroyed in an environmentally safe manner. After the chemicals are removed from the carbon in the regeneration process, the carbon can be used again.

*Ultraviolet Photooxidation
UV photooxidation requires a treatment tank and involves adding certain chemicals to the contaminated ground water and exposing the water to ultraviolet light. This process converts the contaminants into harmless compounds, carbon dioxide, inorganic chloride, and water.

TREATED WATER DISCHARGE

Reinjection
Treated ground water is reinjected through a pipeline and injection wells into the aquifer west of the subsite, upstream of the contaminant plume or other approved locations.

Surface Discharge
The treated ground water would be discharged by pipeline either to Pawnee Creek, south of Hastings, or to a tributary of the West Fork of the Big Blue River.

*City Water Supply
Treated water would be sent by pipeline to the City of Hastings water distribution system.

contaminants would require a much longer duration for operation. A higher rate than considered for cost analysis could remove contaminants in a lesser amount of time.

As was noted in the FS, final design of the pumping rate and distribution within the plume, might be contingent upon further remedial design functions, including a subsite-specific pump test and more sophisticated ground water modeling.

All of the ground water treatment processes under consideration are protective of human health and the environment and comply with appropriate ARARs. In addition, the processes will have long-term effectiveness and permanence because the plume management alternatives all provide for removal of 90% or more of the contaminant mass from the aquifer. Each of the processes reduce the toxicity, mobility and volume through treatment and destruction of the contaminants. The capital costs of the plume management alternatives ranged from $2.8 to $3.8 million. Annual operations and maintenance costs for a 10-year period ranged from $270 to $770 thousand.

The specific plume management alternatives discussed in the FS are identified below. The first four alternatives differ by ground water treatment process, but include surface discharge as the common water discharge option. The next four alternatives listed also differ by treatment process, but include reinjection of treated ground water into the aquifer as the common water discharge option. The last alternative is the only alternative in which pumping to the City water supply is the discharge option. All treatment processes were conceptually designed and cost-estimated based on meeting EPA Drinking Water Standards and the State of Nebraska Ground Water Quality Standards for the discharge. Treatment processes were evaluated based on literature review, vendor information, and prior experience at other sites.

- Mass Removal and Containment; Air Stripping; Vapor Phase Granulated Activated Carbon (Off-site Regeneration); Surface Discharge
- Mass Removal and Containment; Air Stripping; Vapor Phase GAC (On-site Regeneration); Surface Discharge
- Mass Removal and Containment; Liquid Phase GAC; Surface Discharge
- Mass Removal and Containment; Ultraviolet Photooxidation; Surface Discharge
- Mass Removal and Containment; Air Stripping; Vapor Phase GAC (Off-site Regeneration); Reinjection

- Mass Removal and Containment; Air Stripping; Vapor Phase GAC (On-site Regeneration); Reinjection
- Mass Removal and Containment; Liquid Phase GAC; Reinjection
- Mass Removal and Containment; Ultraviolet (UV) Photooxidation; Reinjection
- Mass Removal and Containment; Liquid Phase GAC; City Water Supply

SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES

The NCP sets forth nine evaluation criteria which serve as a basis for comparing the remedial alternatives for final actions. Interim actions, such as those proposed, may not achieve final cleanup levels for the ground water although they are effective in the short term in preventing further degradation and initiating reduction in toxicity, mobility or volume. Nine evaluation criteria were developed by EPA to serve as a basis for comparing the remedial alternatives for final actions. Interim actions, such as those proposed, may not fulfill the requirements of all nine criteria.

The nine criteria are divided into three categories: Threshold Criteria, Primary Balancing Criteria, and Modifying Criteria. If any remedial alternatives identified during the Feasibility Study do not meet the Threshold Criteria (Criteria 1 and 2), EPA will not consider them as possible final remedies. If the alternatives satisfy the Threshold Criteria, they then are evaluated against the next five criteria, called the Primary Balancing Criteria. These criteria are used to compare the remedial alternatives against each other in terms of effectiveness, degree of difficulty involved, and cost. The final two criteria, state acceptance and community acceptance, are called Modifying Criteria. The alternatives are compared against the Modifying Criteria after the state and the community have reviewed and commented on the Proposed Plan and the other alternatives considered by EPA.

Table 4 presents a comparative analysis of how the 11 remedial alternatives satisfy the Threshold and Primary Balancing Criteria. Evaluation of compliance with the remaining Modifying Criteria is included in the following discussion. The following is a discussion of the nine criteria used by EPA for remedy selection and how the alternatives meet the criteria.

TABLE 4 - COMPARATIVE ANALYSIS OF ALTERNATIVES

ALTERNATIVES	THRESHOLD CRITERIA	
	OVERALL PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT	COMPLIANCE WITH ARARS[1]
1. No Action	None	None
2. Institutional Controls	Have been effective in preventing ingestion of contaminated water from on-site wells	None
3. Mass Removal and Containment; Air Stripping; Vapor Phase Granulated Activated Carbon (GAC) (Off-site Regeneration); Surface Discharge	Yes, will prevent further degradation of ground water	Yes[2]
4. Mass Removal and Containment; Air Stripping; Vapor Phase GAC (On-site Regeneration); Surface Discharge	Yes, will prevent further degradation of ground water	Yes[2]
5. Mass Removal and Containment; GAC; Surface Discharge	Yes, will prevent further degradation of ground water	Yes[2]
6. Mass Removal and Containment; Ultraviolet Photooxidation; Surface Discharge	Yes, will prevent further degradation of ground water	Yes[2]
7. Mass Removal and Containment; Air Stripping; Vapor Phase GAC (Off-Site Regeneration); Reinjection	Yes, will prevent further degradation of ground water	Yes[2]
8. Mass Removal and Containment; Air Stripping; Vapor Phase GAC (On-Site Regeneration); Reinjection	Yes, will prevent further degradation of ground water	Yes[2]
9. Mass Removal and Containment; Liquid Phase GAC; Reinjection	Yes, will prevent further degradation of ground water	Yes[2]
10. Mass Removal and Containment; UV Photooxidation; Reinjection	Yes, will prevent further degradation of ground water	Yes[2]
11. Mass Removal and Containment; Liquid Phase GAC; City Water Supply	Yes, will prevent further degradation of ground water	Yes[2]

1. Chemical-specific ARARs are shown in Table 1. Action specific ARARs are shown in Table 5.

2. Treated water will meet MCLS.

TABLE 4 -- COMPARATIVE ANALY OF ALTERNATIVES (CONTINUED)

	BALANCING CRITERIA				
	LONG-TERM EFFECTIVENESS AND PERMANENCE	SHORT-TERM EFFECTIVENESS	REDUCTION OF TOXICITY, MOBILITY AND VOLUME THROUGH TREATMENT	IMPLEMENTABILITY	COST (Expressed in thousands)
1.	None	None	None	Yes -- alternative required by NCP	Cost estimates not prepared
2.	None	None	None	Yes	Capital Cost: $120; Annual O&M: $54; Present Net Worth: $539
3.	Yes	Yes; however, less volatile compounds may not be removed effectively and may enter surface waters	Yes, contaminants destroyed through treatment	Yes; permits for air emission and surface water discharge will be needed	Capital Cost: $3,078; Annual O&M: $303-$598 Present Net Worth: $6,131
4.	Yes	Yes; however, less volatile compounds may not be removed effectively and may enter surface waters	Yes, contaminants destroyed through treatment	Yes; surface water discharge permit will be needed	Capital Cost: $3,754 Annual O&M: $311-$356 Present Net Worth: $6,290
5.	Yes	Yes	Yes, contaminants destroyed through treatment	Yes; surface water discharge permit will be needed	Capital Cost: $3,236 Annual O&M: $277-$700 Present Net Worth: $6,353
6.	Yes	Contaminants would be destroyed on-site; however, treatment process is still new and there is uncertainty with its effectiveness	Yes, contaminants would be destroyed; however, ozone and peroxide used in treatment are highly toxic and would have to be handled and stored with care	May have start-up problems due to newness of technology; surface water discharge permit will be needed	Capital Cost: $3,051 Annual O&M: $380-$396 Present Net Worth: $6,056
7.	Yes	Yes; there could be a low level risk for less volatile compounds not effectively removed to reenter the ground	Technology destroys contaminants; may not destroy MCLs if influent contaminant concentration is high; liquid phase carbon may be needed as a secondary system	Yes; spent GAC requires treatment, storage, and disposal; injection permit will be needed	Capital Cost: $2,788 Annual O&M: $295-$665 Present Net Worth: $5,839
8.	Yes	Yes; less volatile compounds may not be removed effectively and could enter surface waters	Yes, contaminants destroyed through treatment	Yes	Capital Cost: $3,464 Annual O&M: $303-$423 Present Net Worth: $5,998
9.	Yes	Yes; very effective treatment process	Yes	Yes; injection permit will be needed	Capital Cost: $2,946 Annual O&M: $269-$767 Present Net Worth: $6,061
10.	Yes	Contaminants would be destroyed on-site; however, treatment process is still new and there is uncertainty with its effectiveness	Yes, contaminants destroyed through treatment	Pilot test required; injection permit needed	Capital Cost: $2,761 Annual O&M: $372-$463 Present Net Worth: $5,764
11.	Yes	Yes	Reduces volume and mobility; may not achieve reduction of contaminant levels to MCLs	Requires NDOH permitting and monitoring; treatment process requires chlorination	Capital Cost: $3,011 Annual O&M: $315-$738 Present Net Worth: $6,422

Threshold Criteria:

Overall Protection of Human Health and the Environment

The EPA assesses the degree to which the alternatives would eliminate, reduce, or control threats to public health and the environment through removal, containment, and/or institutional controls. An alternative is normally considered to be protective of human health if the excess cancer risk is reduced to a range from 1 in 10,000 to 1 in 10 million and do not pose noncarcinogenic health risks.

The no action alternative and the institutional controls alternative will not provide overall protection to human health and the environment in the future. They will be eliminated from further discussion in this comparative analysis. All of the plume management alternatives are protective of human health and the environment because they will reduce concentrations of chemicals and prevent their migration, and will be the focus of discussion in this ROD.

Compliance with all State and Federal Environmental Regulations

The EPA assesses whether the remedial alternatives being evaluated will comply with all applicable or relevant and appropriate requirements, called ARARs, established by the state and federal governments. As this is an interim action, the NCP allows full compliance with ARARs to be delayed until implementation of the final action. ARARs as referred to here are regulations controlling exposure of humans to ground water with contaminants at levels above the maximum contaminant levels (MCLs). The interim action will provide for treatment of extracted pumped water to MCLs prior to discharge or reinjection.

There are three (3) types of ARARs to be addressed, i.e., chemical-specific, action-specific and location-specific.

- Chemical-specific ARARs are requirements that set final concentrations of chemicals of concern in the contaminated material (e.g., ground water, soil) which must be achieved by the remedial action. This interim remedial action will not attain chemical-specific ARARs (referenced in the State of Nebraska's Title 118 for non-degradation of ground water standards) in the ground water plume as the target concentrations of ground water that would be contained coincide with a

10^{-4} risk level which, for the primary compounds of concern at the Colorado Avenue subsite exceed MCLs. Chemical-specific ARARs will be attained for discharged ground water after treatment. All of the plume management alternatives will comply with MCLs for the disposition of treated ground water.

- Action-specific ARARs are those requirements that set standards for the treatment and discharge components of the remedial action. Action-specific ARARs will apply to the interim and final remedial action and were considered in the Feasibility Study. The use of air stripping, with no emission controls, would result in the discharge of VOCs into the atmosphere. NDEC's Title 129 limits discharges of VOCs to 2.5 tons/year. Air emissions will comply with all ARARs. Technologies considered for the ground water operable unit meet these ARARs.

- Location-specific ARARs are requirements that might apply to a remedial action due to the site's unique cultural, archaeological, historical or physical setting (e.g., wetlands). Location-specific ARARs will not apply to the ground water interim or final remedial action at the Colorado Avenue subsite because there are no such features in the subsite area.

All plume management alternatives will comply with the following Federal laws.

Clean Water Act	33 U.S.C. §§1251-1387
Safe Drinking Water Act	42 U.S.C. §§300f-300j-26
Clean Air Act	42 U.S.C. §§7401-7642
Occupational Safety & Health Act	
Solid Waste Disposal Act, Subtitle C, as amended by the Resource Conservation and Recovery Act of 1976.(RCRA)	29 U.S.C. §§651-678 42 U.S.C. §§6901-6992k

In addition, State of Nebraska ARARs for the Plume Management Alternatives appear in Table 5.

Primary Balancing Criteria:

Long-Term Effectiveness and Permanence

The alternatives are evaluated based on their ability to maintain reliable protection of human health and the environment after the remedial action is completed. This criterion also focuses on the

Table 5

Action-Specific State of Nebraska ARARs

Action-Specific State ARARs		Citation
I.	Nebraska Environmental Protection Act	Neb. Rev. Stat. Ch. 81, Article 15
	Rules and Regulations Governing the Nebraska Pretreatment Program	Neb. Adm. Rules & Regs Title 127
	Effluent Guidelines and Standards	Neb. Adm. Rules & Regs Title 121
	Rules and Regulations Pertaining to the Issuance of Permits Under the National Pollutant Discharge Elimination System	Neb. Adm. Rules & Regs Title 119
	Rules and Regulations for Underground Injection and Mineral Production Wells	Neb. Adm. Rules & Regs Title 122
	Air Pollution Control Rules and Regulations	Neb. Adm. Rules & Regs Title 129
	Nebraska Surface Water Quality Standards	Neb. Adm. Rules & Regs Title 117
	Ground Water Quality Standards and Use Classification	Neb. Adm. Rules & Regs Title 118
	Rules and Regulations Pertaining to Solid Waste Management	Neb. Adm. Rules & Regs Title 132
	Rules and Regulations Governing Hazardous Waste Management in Nebraska	Neb. Adm. Rules & Regs Title 128
	Rules and Regulations Pertaining to the Management of Wastes	Neb. Adm. Rules & Regs Title 126
II.	Water Well Standards and Contractors' Licensing Act	Neb. Rev. Stat. Ch. 46, Article 12
	Regulations Governing Licensure of Water Well and Pump Installation Contractors and Certification of Water Well Drilling and Pump Installation Supervisors	Neb. Adm. Rules & Regs Title 178
III.	Nebraska Safe Drinking Water Act	Neb. Rev. Stat. Ch. 71, Article 53
	Regulations Governing Public Water Supply Systems	Neb. Adm. Rules & Regs Title 179
IV.	Statutes Relating to Disposal Sites	Neb. Rev. Stat. Ch. 19, Article 21 & 4
V.	Statutes Relating to Ground Water	Neb. Rev. Stat. Ch. 46, Article 5

magnitude of health and environmental risks remaining after the remedial action is completed.

Because this is an interim action and not a final remedy, EPA evaluates the alternatives only on the basis of those wastes which are treated. However, EPA will evaluate the effectiveness of the remedy within the first two years of implementation to determine what additional action will be needed as a complement to the selected remedy. Also, as mandated by CERCLA/SARA, EPA will conduct five-year reviews at the site as long as hazardous chemicals remain at the subsite above health-based criteria.

Reduction of Toxicity, Mobility, or Volume Through Treatment

This criterion focuses on the amount and types of hazardous materials that will be destroyed or treated, whether the results of the remedial action are reversible, and whether the alternative includes a treatment process, a remedial action component which is favored by EPA. EPA evaluates each alternative based on how its treatment methods reduce the harmful nature of the contaminants, the ability of the contaminants to move, and the amount of contamination remaining after the remedial action is completed.

All of the plume management alternatives employ treatment. Treatment options including air stripping with air emission control and UV oxidation that can satisfy the goals of the selected remedy may be contaminant reduction goals will be evaluated further during design (as provided by requirements found in the Selected Remedy section of this ROD).

Short-Term Effectiveness

The length of time needed to implement each segment of the alternative is considered, and EPA considers the risks that conducting a particular activity may pose to site workers, nearby residents, or the local environment.

All of the plume management alternatives will utilize techniques to minimize risks to human health and the environment during implementation. The UV technology may require greater implementation time if employed because of the uncertainty of its performance and required air emissions testing. In addition, careful handling and storage of highly toxic chemicals used in the UV process will ensure protection during implementation.

Implementability

The EPA considers the technical (e.g., how difficult the alternative is to construct and operate) and administrative (e.g., how other government agencies and EPA will coordinate monitoring programs) feasibility of a remedy, including the availability of goods and services and personnel (e.g., disposal services, storage capacity) needed to implement and manage the alternative.

All of the plume management options will be implementable, but there is a higher degree of uncertainty of the implementability of UV because it has been implemented at fewer sites.

Cost

The EPA considers capital costs, operation and maintenance costs, and present net worth, which is the cost, expressed in terms of a lump sum at today's dollar value, of the activities that will take place until the remedial action is completed. Capital costs apply to needed equipment and materials and activities such as construction, land and site development, and disposal of waste materials. Annual operation and maintenance costs are spent on activities such as on-going operation of equipment, insurance, and periodic site reviews. Based on cost estimates, all of the plume management options are cost effective. Cost for comparison of the interim action alternatives was based on an extraction rate of 1,000 gallons per minute and duration of ten years (Table 6).

Modifying Criteria:

State Acceptance

The state concurs with the selected remedy as an interim action for the ground water operable unit.

Community Acceptance

The EPA held a public comment period to allow the community to comment on the preferred alternative and the other alternatives considered. Comments were made regarding the scope of costs and plume management options, and treatment technologies described in the Proposed Plan. The EPA reviewed these comments before making a final decision on the interim action remedy.

Table 6

Estimated Costs of the Selected Remedy
Colorado Avenue Subsite
(based on EPA's Feasibility Study, June 1991)

Capital Costs:

Treatment Component	Estimated Cost
Mass Removal	$ 1,076,000
Treatment	$ 1,513,000
Discharge	$ 357,000
	$ 2,946,000

Annual Operation and Maintenance:

Mass Removal	$ 120,000
Treatment[1]	$ 125,000 to $ 548,000
Discharge[2]	$ 24,000 to $ 99,000
	$ 269,000 to $ 767,000

Present Worth:[3]

Mass Removal	$ 2,012,000
Treatment[1]	$ 3,443,000
Discharge[2]	$ 606,000
	$ 6,061,000

[1]A substantial decrease in cost is expected after year one.
[2]Dependant on quantity reinjected.
[3]Present Worth based on weighted average O&M costs as in the FS.

EPA's responses to these comments are included in the Responsiveness Summary section of this document.

SELECTED REMEDY

The EPA selected "Mass Removal and Containment with Liquid Phase Granular Activated Carbon Treatment and Ground Water Reinjection" as the remedy for protecting human health and the environment from ground water contamination. The selected remedy provides the best balance among other interim action alternatives with respect to the evaluation criteria detailed above. This remedy, as previously stated, is protective, implementable, and effective in reducing the toxicity, mobility, and volume of contamination present at the subsite. The NCP does not require that all ARARs be met for an interim action that is consistent with the final remedy.

The selected remedy calls for the design and implementation of this interim remedial action to protect human health and the environment. The goals of this remedial action are to halt the spread of a contaminant plume, remove contaminant mass, and to collect data on aquifer and contaminant response to remediation measures. The ultimate level of remediation to be attained will be determined in a final remedial action for this subsite. This remedial action will be monitored carefully to determine the feasibility of achieving remediation goals with this method and to ensure that hydraulic control of the contaminated plume is maintained. A final action ROD for the ground water which specifies the ultimate subsite goal, remedy and anticipated timeframe will be prepared after a period of time as determined by EPA. Upon completion of the RI/FS for the final action, this interim action may be incorporated into the design of the site remedy specified in the final action ROD.

The major components of the selected remedy include the following:

- The selected remedy will provide for contaminant mass removal and containment of ground water. Approximately 550 million gallons of ground water in the underlying aquifer is contaminated. The selected remedy provides that this volume of ground water will be displaced approximately eight times in a 15-year period. Optimization of the locations and withdrawal rates of the extraction wells may produce pumping efficiencies such that the removal of eight pore volumes will not be necessary throughout the plume are shown in Figure 4.

- The specific ground water extraction rate will be based on an aquifer pump test at the Colorado Avenue subsite. Current information indicates that an extraction system capable of removing one thousand gallons per minute from the aquifer will be needed in the initial stages of pumping, and this remedy provides for an evaluation of pumping rates based on the pump test results and system operational data.

- The selected remedy will provide for treatment of extracted ground water with granular activated carbon (GAC). Alternative treatment technologies (air stripping with air emissions treatment, UV, or combinations which may include GAC) may be implemented based on four criteria -- cost, short-term effectiveness (air emissions), ability to meet contaminant mass removal goals, and implementability. The EPA will issue an explanation of significant differences which includes a public notice, should a treatment alternative other than GAC be approved for implementation.

- The target concentrations for chemicals in the ground water shall be those corresponding to the 1×10^{-4} cancer risk levels due to 30-year exposure, as defined in Table 1, for TCE, DCE, PCE, 1,2-DCA and Methylene Chloride. The performance standards for treated ground water for this interim action shall be the MCLs, shown in Table 1, for TCE, TCA, DCE, PCE, 1,2-DCA and Methylene Chloride.

- The selected remedy will provide for reinjection and/or use of the treated ground water.

- The selected remedy will provide for monitoring of the effectiveness of the interim remedy, including an assessment of the interim action two years subsequent to implementation of the remedial action.

Other components of the selected remedy include:

- Installation of monitoring wells to obtain water quality data to refine EPA's preliminary estimate of the pore volume for the interim action;

- Installation of a monitoring well network for long-term compliance monitoring downgradient from the location of the containment/extraction well network;

- Installation of monitoring wells as needed and recording of water level measurements at prescribed frequencies, to verify that the system hydraulically responds as required;

- Monitoring of extraction well influent contaminant levels; and

- Monitoring treated water effluent quality for VOCs utilizing laboratory methods prescribed by SDWA having detection levels which will assure MCLs are not exceeded.

The remedy provides an approach to containing and removing contaminant mass from the ground water plume. The remedy will rapidly reduce contaminant concentrations and be consistent with the final remedy. The containment area required by this interim action will provide a significant level of protectiveness to human health for both carcinogenic and non-carcinogenic potential health effects.

The specific elements of the initial extraction system will be determined during the Remedial Design. Subsequent modifications will be based on the review of data generated during initial operations. Extraction parameters to be determined include well location, depth of withdrawal within the aquifer and pumping rate. The ground water contaminant parameters of concern shown in Table 2 will be monitored frequently before and during system operation. Continual evaluation of monitoring data will ensure that hydraulic control of contaminated ground water is maintained. All collected data will be evaluated to determine the final remedial action goals for ground water.

The pumped ground water will be treated with granular activated carbon and then reinjected into the aquifer. The treated ground water will be injected into the aquifer upstream of the contaminant plume. Other locations for reinjection may be considered pending approval by the appropriate regulatory agencies. All extracted ground water will be treated to drinking water quality standards (MCLs) prior to discharge, and all action specific ARARs will be met. The ARARs are shown in Tables 1 and 5.

Granular activated carbon (GAC) is a proven technology that has been used successfully at a number of Superfund sites. This alternative is easily implemented. Operationally, GAC treatment has several distinct advantages. There are no air emissions associated with the process, it is effective in removing a wide range of VOCs and other organics, and is also effective over a wide range of influent concentrations. All of these factors reduce the risk of human exposure during operation.

Additionally, GAC is a relatively low maintenance system. The system requires frequent monitoring, but little in the way of maintenance. Monitoring and carbon changeouts would become less frequent with time as experience is gained and influent concentrations decrease.

Operationally, the GAC treatment plant would consist of a 10,000 gallon influent tank to provide surge capacity and equalization of flow into the carbon columns. Contaminant removal should be nearly 100 percent. Series operation, that is, water flowing through two carbon beds in sequence, gives GAC the additional advantage over the other considered processes of having a reserve treatment capacity at all times. By monitoring the treated water effluent from the first column in series, contaminant breakthrough would be detected well before the second column in series were significantly loaded.

The EPA has considered costs due to carbon usage. Carbon consumption is directly proportional to the amount of contamination removed from the ground water. Because of this, the process is very sensitive to influent contaminant concentrations. Costs can increase if the actual contaminant loading rate were to be higher than estimated in the FS.

Ground water reinjection has been identified as the preferred method of water discharge because of its ability to return ground water to the aquifer for beneficial use. Reinjection was considered preferable to surface water discharge because the latter would not result in beneficial use of the pumped ground water. Options for use of the pumped ground water will be considered upon request.

The total cost of the remedy, in 1991 dollars, based on operating costs for a 10-year life, was estimated to be $6.06 million. These costs are explained in Table 6. Based on considerations by EPA and comments received during the public comment period, EPA has increased the estimated remedial action timeframe for this interim action to 15 years. The total present value cost of the remedy under this circumstance will increase from the 10-year estimate primarily due to a longer period of O&M.

STATUTORY DETERMINATIONS

The selected remedy will achieve substantial reduction in risks by initiating the reduction of the toxicity, mobility and volume of ground water contaminants, by limiting ground water contaminant migration and by reducing environmental risks associated with the contaminated ground water.

The selected remedy meets ARARs for the treatment of the extracted ground water, the disposal of spent carbon and control of air emissions from treatment processes. This determination is based on the remedy's compliance with the following federal standards and State of Nebraska standards listed in Table 5. Federal ARARs are the Safe Drinking Water Act, the Clean Air Act, the Resource Conservation and Recovery Act, Occupational Safety and Health Act and Clean Water Act.

The selected remedy will protect human health and the environment, prevent further environmental degradation, and will achieve significant risk reduction while a final remedial action is being prepared. The selected remedy is protective of human health because the interim action will reduce contaminant concentrations in the aquifer to a level that will achieve a significant reduction in risk. This level will be at or below the 1×10^{-4} cancer risk level, or a risk of less then one case in 10,000 due to exposure to contamination. This will provide a significant level of protectiveness to human health for both carcinogenic and non-carcinogenic potential health effects. In addition to risk reduction, the interim action will stabilize the ground water contaminant migration and prevent further degradation of the environment by mass removal and plume control. The overall effectiveness of this remedy is proportional to the projected costs and provides the best balance among the alternatives with respect to the evaluation criteria.

The implementation of either air stripping, GAC or UV or a combination, will be based on four criteria -- cost, short-term effectiveness (air emissions), ability to meet mass contaminant removal goals, and implementability.

Because this remedy will result in hazardous substances remaining onsite above health-based levels, a review will be conducted to ensure that the remedy continues to provide adequate protection of human health and the environment within five (5) years after commencement of the remedial action. Review of the subsite source control and ground water remedies will be ongoing as EPA continues to develop final remedial alternatives for the Colorado Avenue subsite.

DOCUMENTATION OF SIGNIFICANT CHANGES

EPA has selected an interim remedy consisting of mass removal and containment. The selected remedy provides that the ground water will be treated using granular activated carbon. However, air stripping with air emissions treatment or ultraviolet oxidation may be considered as an alternative to liquid phase carbon treatment. The selected remedy specifies that the treated water must be either reinjected or made available to others for use in order to minimize depletion of the ground water resources.

The changes to the interim action reflected in this ROD compared to the Proposed Plan were made after careful consideration of public and PRP comments. The differences that exist between EPA's proposed plan and the selected remedy relate to the timeframes for implementation. The EPA has reevaluated the proposed ten year period of active pumping outlined in the proposed plan. To provide more flexibility for the project designers, the timeframe for the active pumping phase has been extended to 15 years. This will allow pumping and treating of the ground water concurrent with field testing and various design and installation activities. In summary, to promote site cleanup in a timely manner, pumping and treating of ground water can be initiated after the installation of extraction wells and completion of the aquifer pump test.

The EPA will evaluate information gained during the first two years of remedial action to assess the decline in the concentration of ground water contamination and mass of contaminants removed. This evaluation will be conducted two years after implementation of the interim action and include a review of ground water pump rates and number of extraction wells.

The selected interim remedy also includes monitoring of ground water quality both during and after completion of the active pumping phase of the project. The selected interim remedy requires ground water monitoring during the 15-year active pumping phase and for a period of ten years after completion of the active pumping phase of the interim action. The data collected will be used to assure that the interim action has effectively reduced the concentration of contaminants in the aquifer to the health-based target levels defined by this Record of Decision.